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PERFORMANCE SPECIFICATION
FOR THE
JOINT LASER ORDNANCE NEUTRALIZATION SYSTEM (JLONS)

1. Scope

1.1. Scope This specification establishes the performance and test requirements for the Joint Laser Ordnance Neutralization System (JLONS).

2. Applicable Documents

2.1. General The documents listed in this section are specified in section 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements as cited in section 3 and against the verification criteria listed in section 4 of this specification.

2.2. Government Documents The following standards form a part of this document to the extent specified. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

2.2.1. Specifications, Standards, and Handbooks The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

STANDARDS

MILITARY

MIL-STD 129P	-	Military Marking for Shipment and Storage
MIL-STD-167-1	-	Mechanical Vibrations of Shipboard Equipment (Type I – Environmental and Type II – Internally Excited)

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- | | | |
|-----------------|---|--|
| MIL-STD-461E | - | Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment |
| MIL-STD-464A | - | Electromagnetic Environmental Effects Requirements for Systems |
| MIL-STD-810F | - | Environmental Test Methods and Engineering Guidelines |
| MIL-STD-882C | - | System Safety Program Requirements |
| MIL-STD-882D | - | Standard Practice for System Safety |
| MIL-STD-1472F | - | Human Engineering |
| MIL-STD-1366 | - | Transportability Criteria |
| MIL-STD-2073-1D | - | Standard Practice for Military Packaging |

FEDERAL

- | | | |
|-------------|---|--|
| FED-STD-313 | - | Material Safety Data, Transportation Data And Disposal Data For Hazardous Materials Furnished To Government Activities |
|-------------|---|--|

HANDBOOKS

MILITARY

- | | | |
|--------------|---|--|
| MIL-HDBK-240 | - | Hazards of Electromagnetic Radiation to Ordnance (HERO) Test Guide |
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SPECIFICATIONS

MILITARY

- | | | |
|---------------|---|------------------------|
| MIL-PRF-29612 | - | Training Data Products |
|---------------|---|------------------------|

2.2.2. Other Government documents, drawings, and publications The following other Government documents, drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

ARMY REGULATION

- | | | |
|-----------|---|--------------------------------------|
| AFR 80-18 | - | DoD Engineering For Transportability |
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CHIEF OF NAVAL OPERATIONS /MARINE CORPS ORDER

OPNAV 5100.27A/
MCO 5104.1B - Navy Laser Hazards Control Program

CODE OF FEDERAL REGULATIONS

21 CFR, Part 1040 - Performance Standards for Light-Emitting Products
29 CFR - Labor
40 CFR - Protection of Environment
49 CFR - Transportation

DEPARTMENT OF ARMY AND COMMANDANT US MARINE CORPS

MCWP 3-37.3/FM3-5 - NBC Decontamination Operations

DEPARTMENT OF DEFENSE

DIRECTIVE

DoD 4140.25 - DoD Management Policy for Energy
Commodities and Related Services

NAVAL SEA SYSTEMS COMMAND

INSTRUCTION

NAVSEAINST 8020.19 - Electrostatic Discharge Safety Program for
Ordnance

OPERATING PROCEDURES

NAVSEA OP 3565 - Electromagnetic Radiation Hazards

NATO STANDARDIZATION AGREEMENT (STANAG)

NATO STANAG 4362 - Fuels for Future Grade Equipment Using
Compression Ignition of Turbine Engines

2.3. Non-Government Publications The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM 4169-04a - Standard Practice for Performance Testing of
Shipping Containers and Systems

2.4 Order of precedence In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. Requirements

3.1. General requirement The JLONS system is to consist of a modular laser system designed to neutralize ordnance in accordance with the specifications detailed throughout this document.

3.2. Performance requirements

3.2.1. Effectiveness – Neutralization The JLONS shall effectively neutralize ordnance. Effectiveness is defined as the number of successful neutralizations per the amount of attempted neutralizations, or

$$E = \frac{\text{Number of successful neutralizations}}{\text{Number of attempted neutralizations}}$$

performed while the prime mover is operating but stationary. An item is neutralized when it is no longer capable of functioning as designed.

Threshold: .90 with 80% confidence level.

Objective: .95 with 80% confidence level.

3.2.2. Effectiveness – Range The JLONS shall acquire and neutralize targets at the minimum and maximum specified ranges.

The minimum range is 25 m.

Threshold maximum range: 250 m.

Objective maximum range: 450 m.

3.2.2.1. Target Size The JLONS shall acquire and neutralize 3" x 4" targets at all ranges between 25 and 250 m.

3.2.3. Rate of Neutralization The JLONS shall neutralize a given number of items per hour.

Threshold: 30 items per hour.

Objective 60 items per hour.

3.2.4. Laser Beam Power Manipulation The JLONS shall have adjustable beam power output.

Threshold: Output power continuously variable between 10% and 100%

Objective: Output power continuously variable between 0% and 100%

3.2.5. Target Data Acquisition and Recording The JLONS shall acquire all data on location and range of targets and record all target acquisition and engagement data during operation, both in numerical and video formats.

Threshold: Able to record and export numerical and visual data pertaining to the operation including location coordinates, threat present, and reaction of neutralization via common commercial software.

Objective: Able to record and export, in real time, numerical and visual data pertaining to the operation such as location coordinates (GPS), threat present, and reaction of neutralization via common commercial software.

3.2.6. Night Vision The JLONS shall acquire and neutralize targets in low or negligible light conditions without compromising the location of the JLONS and without the use of additional visible light sources.

Threshold: Able to acquire and neutralize in low-light conditions, 0.1 lux illuminance (full moon)

Objective: Able to acquire and neutralize in negligible light conditions, 0.001 lux illuminance (starlight).

3.2.7. Accuracy The JLONS target designator shall aim within a specified distance from the actual lasing point achieved on target.

Threshold: Target designator aim point on target not to exceed 5mm from actual lasing point on target at all ranges.

Objective: Target designator aim point on target not to exceed 2 mm from actual lasing point on target at all ranges.

3.2.8. Beam Slew

3.2.8.1 Slew Rate The JLONS shall slew at 3° per second while lasing, and 30° per second while not lasing.

3.2.8.2 Slew Range The JLONS shall slew over the given range of degrees azimuth and elevation.

Threshold: ? 150° azimuth, ? 20° elevation,

Objective: 360° azimuth, elevation same as threshold.

3.2.9. Beam focus The JLONS shall be able to focus and defocus its beam to produce a variable spot size on target.

Threshold: Diameter of the spot adjustable between the minimum attainable spot size and a spot size no more than 10 diameters larger than minimum size at 250 m.

Objective: Diameter of the spot adjustable between the minimum attainable spot size and a spot size no more than 10 diameters larger than minimum size at 450 m.

3.2.10. Endurance The JLONS shall be operable and meet effectiveness, rate of neutralization and range requirements for the time specified.

Threshold: 4 hours

Objective: 8 hours

3.2.11. Operator Control Console All JLONS controls, data input and data output necessary for the operation, calibration, set-up and stowage functions of the JLONS shall be located on one detachable operator control console that is able to be connected with one interface to the rest of the system. Only digital signals shall transfer between the control box and the rest of the JLONS, there shall be no power transfer in or out of the control box. The JLONS operators shall be able to fully operate, calibrate, set-up and stow the JLONS for mission use while the console is electronically connected, but not physically attached to the rest of the JLONS system.

3.3. Interoperability Requirements

3.3.1. Prime mover vehicle The JLONS shall be mounted to the vehicles specified as prime mover. The JLONS, while mounted on its prime mover and fully operating but stationary, shall meet the system effectiveness requirements of 3.2.1. while in proximity of currently used jamming systems. The JLONS shall be integrated to the prime mover with little or no modification to the exterior of the vehicle.

Threshold: Integrated to the Cougar 4X4 and 6X6 models, the HMMWV, and the RC-50 as prime movers.

Objective: Integrated to the Cougar 4X4 and 6X6 models, the HMMWV, and the RC-30 as prime movers.

3.3.2. Weight The JLONS shall not exceed the specified weight.

Threshold: 1500 lbs

Objective: 800 lbs.

3.4. Logistics Requirements

3.4.1. System Reliability The JLONS shall be reliable. Reliability is defined as the probability of completing a mission without an operation mission failure. An operational mission failure is one that precludes successful completion of a mission. System reliability is measured by the Mean Time Between Operational Mission Failures – System (MTBOMF_{sys}). The MTBOMF_{sys} is defined as:

$$MTBOMF_{sys} = \frac{Total\ System\ Operating\ Time}{Number\ of\ Operational\ Mission\ Failures}$$

Threshold: 320 Hours,

Objective 640 Hours

3.4.2. Availability The JLONS shall be available. Availability is the measure to which the system is in an operable and committable state at the start of a mission when the mission is called for at an unknown (random) time. For JLONS, operational availability (A_o) is calculated as:

$$A_o = \frac{MTBOMF_{sys}}{MTBOMF_{sys} + MCMTOMF + MLDT}$$

where $MTBOMF_{sys}$ is Mean Time Between Operational Mission Failures – System and $MCMTOMF$ is Mean Corrective Maintenance Time for Operational Mission Failures, and $MLDT$ is Mean Logistics Delay Time.

Threshold: .80

Objective: .95

3.4.3. General Transportability (major movement) The JLONS shall be transportable by the vehicles specified in one of the three following configurations: shipping; fully assembled and integrated onto the prime mover; and Lowest Replaceable Unit (LRU) in shipping configuration.

3.4.3.1. Operational Configuration The JLONS in its fully assembled and integrated state shall withstand the vibration of the prime mover vehicle it is mounted to.

3.4.3.2. Shipping configuration

3.4.3.2.1. Ground: The JLONS in its shipping configurations and LRUs in shipping configurations shall be transportable by Commercial Utility Cargo Vehicle (CUCV), Highly Mobile Multi-purpose Wheeled Vehicle (HMMWV), Tractor trailers, Railway car

Threshold: able to withstand 2100 miles of ground travel

Objective: Able to withstand 3000 miles of ground travel

3.4.3.2.2. Air:

3.4.3.2.2.1. Jet aircraft cargo: The JLONS in its shipping configurations and LRUs in shipping configurations shall be transportable by C-5, C-17, and C-141 aircraft

Threshold: able to withstand 8400 miles of air travel

Objective: able to withstand 12,000 miles of air travel

3.4.3.2.2.2. Propeller aircraft: The JLONS in its shipping configurations and LRUs in shipping configurations shall be transportable by C-130 aircraft

Threshold: able to withstand 8400 miles of air travel

Objective: able to withstand 12,000 miles of air travel

3.4.3.2.2.3. Helicopter: The JLONS in its shipping configurations and LRUs in shipping configurations shall be transportable in CH-46, UH-1, 53 Series helicopters and 60 series helicopters.

Threshold: and 105 miles of air travel

Objective: 150 miles of air travel

3.4.3.2.3. Sea: The JLONS in its shipping configuration and LRUs in shipping configurations shall withstand 8000 miles of travel on a naval ship.

3.4.4. Set-up time

3.4.4.1. Storage to Mission-Ready State The JLONS shall be prepared in a safe area from its storage configuration to its mission-ready configuration integrated onto its prime mover and calibrated for use in the time specified.

Threshold: 30 minutes

Objective: 10 minutes

3.4.4.2. Prepare to operate and prepare to travel during mission During the mission, the JLONS shall be prepared to perform lazing operations once the vehicle is stationary and prepared to travel once target is neutralized in the total time specified.

Threshold: maximum of 4 minutes total for preparation time.

Objective: maximum of 2 minute total for preparation time.

3.4.5. Maintainability The JLONS shall be maintainable. Maintainability is the ability of the system to be retained in, or restored to, a specified condition. Maintainability also considers the ease of the maintenance when performed by personnel having specified skill levels, and using prescribed procedures and resources at each prescribed level of maintenance and repair. Maintainability shall be measured by Mean Corrective Maintenance Time for Operational Mission Failures (MCMTOMF) (at organizational-level only) which is the average time to perform active corrective maintenance. Corrective maintenance is the time during which one or more personnel are repairing an operational mission failure and includes: preparation, fault location, part procurement time from local (on-board) sources, fault correction, adjustment and calibration, and follow-up checkout time. It excludes off-board logistic delay time. Maintainability is not applicable to single-use items.

$$MCMTOMF_{sys} = \frac{\text{Total Elapsed Time to Correct Operational Mission Failures}}{\text{Total Number of Operational Mission Failures}}$$

Threshold: 2 hours

Objective: 1 hour

3.4.6. Training An EOD technician with existing skill levels shall be trained to use the JLONS system to engage targets in the time specified.

Threshold: 5 days

Objective 2.5 days

3.4.7. Portability – Lowest Replaceable Unit (LRU) The JLONS LRUs shall meet the specified weight and portability requirements.

Threshold: 70 lbs. or less per component in its shipping configuration and able to be carried by two people.

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Objective: 35 lbs. or less per component in its shipping configuration and able to be carried by one person.

3.4.8. Fuels Any JLONS component requiring the use of fossil fuel for power shall operate using JP-8 fuel (NATO F-34) in accordance with DoD Directive 4140.25 and NATO STANAG 4362.

3.5. Environmental Requirements

3.5.1. Survivability The JLONS shall survive the blast overpressure and fragmentation produced from UXO/IED neutralization processes. Survivability is defined as meeting the effectiveness-neutralization requirement after exposure to the aforementioned blast overpressure and fragmentation produced from the high order detonation of the item neutralized. Fragmentation will occasionally hit the JLONS.

Threshold: The JLONS shall provide survivability against fragmentation and blast overpressure at ranges 25 m – 250 m represented by a peak overpressure of 2.5 psi. The JLONS shall survive impact from BLU-97 DP Munition, M14 AP Mine, 60 mm HE, 105mm HE, and 155mm HE fragmentation 0.80 of the time.

Objective: The JLONS shall provide survivability against fragmentation and blast overpressure at ranges 25 m – 250 m represented by a peak overpressure of 2.5 psi. The JLONS shall survive impact from BLU-97 DP Munition, M14 AP Mine, 60 mm HE, 105mm HE, and 155mm HE fragmentation 0.95 of the time.

3.5.2. Decontamination Ability The JLONS removed from the prime mover shall survive appropriate decontamination procedures decontamination with household bleach (or equivalent) and hot soapy water within the time specified and meet subsequent operational and effectiveness requirements.

Threshold: Entire system decontaminated in 10 hours.

Objective: Entire system decontaminated in 2 hours.

3.5.3. Shock/drop The JLONS in its shipping/storage configuration and LRUs shall meet effectiveness requirements after being dropped from a height to be determined based on the weight of the item as specified in MIL-STD-810F method 516, table 516.5-VI, “Transit Drop Test.”

3.5.4. Blowing sand The JLONS shall meet effectiveness requirements after exposure to blowing sand.

3.5.5. Temperature

3.5.5.1. Operational Temperature – Maximum The JLONS in its operational configuration shall meet effectiveness requirements while operating in a maximum temperature of 120°F.

3.5.5.2. Operational Temperature – Minimum The JLONS in its operational configuration shall meet effectiveness requirements while operating in a minimum temperature of -25°F.

3.5.5.3. Storage Temperature – Maximum The JLONS and LRUs shall meet effectiveness requirements after being stored at a maximum temperature of 160°F.

3.5.5.4. Storage Temperature – Minimum The JLONS and LRUs shall meet effectiveness requirements after being stored at a minimum temperature of -45°F.

3.5.6. Humidity The JLONS shall meet effectiveness requirements after exposure to combined 95% relative humidity and 60°C temperature.

3.5.7. Rain The JLONS components and all LRUs in shipping configuration and any JLONS component mounted to the exterior of the prime mover in operational configuration shall meet effectiveness requirements after exposure to rain and blowing rain.

3.5.8. Vapor Susceptibility The JLONS system shall not be affected by chemicals and vapors normally present as a results of air base operations (e.g. gasoline, JP-8, engine oil, hydraulic fluid, ammonia, paint thinner, etc.)

3.5.9. Solar Radiation JLONS components with exterior exposure shall meet effectiveness requirements after exposure to solar radiation.

3.5.10. Temperature Shock The JLONS system components and LRUs in shipping configuration shall withstand temperature shock between -25°F and 120°F.

3.5.11. Ice/Freezing Rain JLONS components with exterior exposure shall withstand ice accumulation to 13mm and exposure to freezing rain.

3.6. Safety Requirements The JLONS Safety Requirements will be developed according to the guidelines of the Department of Defense (DoD) MIL-STD-882D. MIL-STD-882C will be used as guidance to identify the more complicated tasks outlined in the safety program. The JLONS safety requirements will achieve concurrence with the Army Material Certification process, Navy Weapon System Explosive Safety Review Board, the Air Force Directed Energy Weapons Review Board and the services' Laser Safety approval authorities. If lithium batteries are used in the system, they will meet the requirements of the Naval Lithium Battery Safety Program. Additionally, the system must be integrated to specific vehicles; vehicle loading, center of gravity and other motor vehicle safety factors will meet service safety standards for each integrated platform.

If any laser system safety critical actions are controlled by autonomous or semi autonomous software functions then that software will require an independent System Software Safety study and acceptance by the Navy's System Software Safety Technical Review Panel.

System design shall meet the requirements of the Navy Laser Hazards Control Program checklist, OPNAV 5100.27A/MCO 5104.1B, where practicable. Specifically, enclosure (2) checklist shall be the design goal and is intended to help the designer, procuring activity and other personnel stay within the laser safety design requirements for military lasers and associated support equipment. This checklist should not be used by itself, but in conjunction with other references in Table 2.0. If tactical considerations prevent compliance with OPNAV 5100.27A/MCO 5104.1B, the contractor shall request a military exemption from the Government. To receive an exemption, the contractor must submit a list of deviations from OPNAV 5100.27A/MCO 5104.1B or alternatively, Title 21 CFR, Part 1040 in order for the Government to assess the safety of the laser design.

The Safety requirements are tailored according to MIL-STD-882. The JLONS System Safety Program will be comprised of the following tasks:

- 1) Hazard Tracking and Risk Resolution,
- 2) Preliminary Hazard Analysis (PHA),
- 3) Subsystem Hazard Analyses (SSHA),
- 4) System Hazard Analyses (SHA),
- 5) Safety Assessment,
- 6) Operating and Support Hazard Analysis (O&SHA).

3.6.1. Electromagnetic Environmental Effects (E3) Requirements The JLONS shall be electromagnetically compatible among all subsystems and equipment within the system and with environments caused by electromagnetic effects external to the system. The JLONS shall be electromagnetically compatible within itself such that system operational performance requirements are met. Electromagnetic Interference (EMI) generated by a subsystem or other subsystems and equipment must not degrade the overall JLONS effectiveness. Electromagnetic compatibility among antenna-connected subsystems (termed Radio Frequency (RF) compatibility on some programs) is an essential element of system performance. Inability of an antenna connected subsystem to properly receive intentional signals can significantly affect mission effectiveness. Achieving compatibility makes use of careful, strategic planning for the placement of receiver and transmitter antennas on the system and on the interoperability of the subsystems.

3.6.1.1. Electromagnetic Interference Requirements

3.6.1.1.1. Emissions The JLONS emissions shall be characterized to identify potential safety hazards to Hazards of Electromagnetic Radiation to Personnel (HERP), Hazards of Electromagnetic Radiation to Ordnance (HERO), and Hazards of Electromagnetic Radiation to Fuel (HERF). The JLONS radiated emissions, device emissions, and noise emissions must not interfere with other systems that may obstruct mission completion.

The JLONS must interoperate with other military systems within close proximity of its electronic emissions per MIL-STD-464 and MIL-STD-461E. The JLONS must be able to operate without degradation per Table IV in MIL-STD-461E for ground combat systems.

3.6.1.1.2. Susceptibility The JLONS shall be tested for susceptibility to electromagnetic environmental effects. The system must not be susceptible to radiation from outside systems in a combat situation. The JLONS must be tested for electronic emissions in ground systems per MIL-STD-461E.

3.6.1.2. Electrostatic Discharge The JLONS, all components and LRUs shall be safe and operable after exposure to human borne electrostatic discharge at the level specified in NAVSEAINST 8020.19.

3.6.2. Human Systems Integration The JLONS shall be designed using MIL-STD-1472F Human Engineering and OPNAV 5100.27A/MCO 5104.1B. The JLONS shall be readily employed by an EOD technician dressed in a Flak vest, helmet, and mission oriented protective posture, level IV (MOPP IV) gear or equivalent in combination with any additional laser protective gear. Lights and displays will be fully readable and all protective gear must be compatible with eyeglasses or inserts as well as with night vision glasses.

3.6.3. Remotely Operated System Design Safety

3.6.3.1. Mechanical The JLONS shall be designed such that:

- A firing mechanism device shall be a Fail-Safe design such that vibration or shock shall not allow the JLONS to function.
- A Mechanical safety feature shall allow the JLONS to be safed until it is intended to be fired and provide a SAFE and FIRE indication.
- A manual operated switching device shall be incorporated to disrupt electrical fire controls.
- A manual operated device shall be incorporated to safe the system.

3.6.3.2. Electrical The JLONS shall be designed such that:

- No single component failure shall cause the arming or firing of the JLONS.
- Electrical systems shall be a Fail-Safe design.
- The JLONS shall incorporate independent control and signal paths for the firing and safety functions, using a single RF link.
- Overall switching control shall be incorporated to override and cease operation of the JLONS.
- All status features and displays shall incorporate a press-to-test capability.
- Single point failure in the aiming device shall fail-safe the system.

3.6.3.3. Control Software The JLONS software shall be designed such that:

- Controlling software shall be a Fail-Safe Design.
- Configuration control shall be maintained on all embedded and programmable software items.
- Platform and camera control shall be maintained if possible during Fail-Safe modes and additionally when the JLONS is safed.
- Software shall guard against corrupted and/or misdirected messages by incorporating some form of error detection for any run time configuration.

-If communication is lost for some predetermined time, the JLONS shall return to a safe state until communication can be reestablished (Watchdog).

-Software shall be robust and disallow unauthorized user intrusion at any physical interface.

3.6.3.4. Joint Architecture for Unmanned System (JAUS) Control Software The JLONS shall be designed such that:

-Software shall require that sequential steps take place in a specific time-frame before ARMing and FIREing of the JLONS.

-Software should be robust and disallow unauthorized user intrusion at any logical interface.

-Software fields should be readily defined for safety critical messages.

-Bit streams should be consistent if possible for initialization, ready, standby, failure, emergency, clear, query status and status.

-Any out of sequence logical event or timing function shall cause the JLONS to return to a safe state.

-Safety messages should use high priority field in JAUS message header.

4. Verification

4.1. Requirements The following chart cross-references the requirements paragraphs in section three with verification methods paragraphs in section four.

Table 1 – Requirement and Verification Method Cross-Reference Chart

Requirement	Requirement Paragraph	Verification Paragraph
Performance Requirements	3.2.	4.2.
Effectiveness – Neutralization	3.2.1.	4.2.1.
Effectiveness – Range	3.2.2.	4.2.2.
Target Size	3.2.2.1.	4.2.2.1.
Rate of Neutralization	3.2.3.	4.2.3.
Laser Beam Power Manipulation	3.2.4.	4.2.4.
Target Data Acquisition and Recording	3.2.5.	4.2.5.
Night Vision	3.2.6.	4.2.6.
Accuracy	3.2.7.	4.2.7.
Beam Slew	3.2.8.	4.2.8.
Slew Rate	3.2.8.1.	4.2.8.1.
Slew Range	3.2.8.2.	4.2.8.2.
Beam Focus	3.2.9.	4.2.9.
Endurance	3.2.10.	4.2.10.
Operator Control Console	3.2.11.	4.2.11.
Interoperability Requirements	3.3.	4.3.
Prime Mover Vehicle	3.3.1.	4.3.1.
Weight	3.3.2.	4.3.2.
Logistics Requirements	3.4.	4.4.
System Reliability	3.4.1.	4.4.1.
Availability	3.4.2.	4.4.2.

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General Transportability (major movement)	3.4.3.	4.4.3.
Operational Configuration	3.4.3.1.	4.4.3.1.
Shipping Configuration	3.4.3.2.	4.4.3.2.
Ground	3.4.3.2.1.	4.4.3.2.1.1., 4.4.3.2.1.2., 4.4.3.2.1.3.
Air	3.4.3.2.2.	4.4.3.2.2.
Jet aircraft cargo	3.4.3.2.2.1.	4.4.3.2.2.1.
Propeller aircraft	3.4.3.2.2.2.	4.4.3.2.2.2.
Helicopter	3.4.3.2.2.3.	4.4.3.2.2.3.
Sea	3.4.3.2.3.	4.4.3.2.3.
Set-up Time	3.4.4.	4.4.4.
Storage to Mission-Ready State	3.4.4.1.	4.4.4.1.
Prepare to operate and prepare to travel during mission	3.4.4.2.	4.4.4.2.
Maintainability	3.4.5.	4.4.5.
Training	3.4.6.	4.4.6.
Portability – Lowest Replaceable Unit (LRU)	3.4.7.	4.4.7.
Fuels	3.4.8.	4.4.8.
Environmental Requirements	3.5.	4.5.
Survivability	3.5.1.	4.5.1.
Decontamination Ability	3.5.2.	4.5.2.
Shock/Drop	3.5.3.	4.5.3.
Blowing Sand	3.5.4.	4.5.4.
Temperature	3.5.5.	4.5.5.
Operational Temperature – Maximum	3.5.5.1.	4.5.5.1.
Operational Temperature – Minimum	3.5.5.2.	4.5.5.2.
Storage Temperature – Maximum	3.5.5.3.	4.5.5.3.
Storage Temperature – Minimum	3.5.5.4.	4.5.5.4.
Humidity	3.5.6.	4.5.6.
Rain	3.5.7.	4.5.7.
Vapor Susceptibility	3.5.8.	4.5.8.
Solar Radiation	3.5.9.	4.5.9.
Temperature Shock	3.5.10.	4.5.10.
Ice/Freezing Rain	3.5.11.	4.5.11.
Safety Requirements	3.6.	4.6.
Electromagnetic Environmental Effects (E3) Requirements	3.6.1.	4.6.1.
Electromagnetic Interference Requirements	3.6.1.1.	4.6.1.1.
Emissions	3.6.1.1.1.	4.6.1.1.1.
Susceptibility	3.6.1.1.2.	4.6.1.1.2.
Electrostatic Discharge	3.6.1.2.	4.6.1.2.
Human Systems Integration	3.6.2.	4.6.2.
Remotely Operated System Design Safety	3.6.3.	4.6.3.
Mechanical	3.6.3.1.	4.6.3.
Electrical	3.6.3.2.	4.6.3.
Control Software	3.6.3.3.	4.6.3.
Joint Architecture for Unmanned System (JAUS) Control Software	3.6.3.4.	4.6.3.

4.2. Performance Requirements

4.2.1. Effectiveness – Neutralization The JLONS shall be tested in its fully operational state in standard ambient conditions defined as 25°C?10°C (77°F?18°F) and 20 – 80% RH, while integrated on the prime mover. The prime mover shall be operating (on, but not moving) during all effectiveness tests. A representative sample of 30 ordnance items shall be placed at varying ranges between 25 – 250 meters, at varying angles and orientations with respect to the JLONS system. The locations of these ordnance items will be known to the operator previous to testing, and however, may not be pre-programmed into the vehicle prior to testing. The items may also be flagged for identification. The ordnance items tested shall consist of the following items: BLU-97 DP Munition, M14 AP Mine, 60mm HE, 105mm HE, 155mm HE. The complete test set will be made of 6 of each of these five types of ordnance, for a total of 30 items. Figure 6.1. and Table 6.1. in section 6.1. show the proposed test setup.

The JLONS shall pass the test with .9 reliability with 80% confidence if it neutralizes no less than 29 of the 30 items, and passes the rate of neutralization test specified in 4.2.3.

4.2.2. Effectiveness – Range The JLONS shall be tested in its fully operational state in standard ambient conditions, while integrated on the prime mover. The prime mover shall be operating (on, but not moving) during all effectiveness tests. The representative ordnance items given in 4.2.1. shall be placed between the ranges of 25 and 250 meters, inclusive. Figure 6.1.in section 6.1. shows the location of the ordnance items, and Table 6.1 shows the exact coordinates of these ordnance items. The JLONS must be able to both acquire and neutralize the item at a given range to be considered successful at that given range. The JLONS shall pass the range effectiveness test if it can acquire and neutralize the ordnance between 25 – 250 meters, inclusive, and pass the rate of neutralization test specified in 4.2.3.

4.2.2.1. Target Size The JLONS must be able to acquire and neutralize a target sized no more than 3” x 4” at all ranges demonstrated during the test described in 4.2.2.

4.2.3. Rate of Neutralization The JLONS shall be tested in its fully operational state in standard ambient conditions, while integrated on the prime mover. The prime mover shall be operating (on, but not moving) during all rate tests. The JLONS rate shall be determined by timing the neutralization test described in 4.2.1. from the start of the target acquisition process for the first target to the successful neutralization of the last target. The rate shall be determined by dividing the number of ordnance items neutralized by the total time in hours. The JLONS shall pass the test if it meets the requirement of at least 30 items neutralized per hour.

4.2.4. Laser Beam Power Manipulation The JLONS beam power output shall be tested for the ability to be varied between 10% and 100% of its maximum power output. The maximum power output shall be measured at a distance 25 m, and then the operator shall incrementally lower the power. The output shall be continuously monitored until a value of 10% of the maximum beam power is reached. The JLONS shall pass the test if it can successfully produce any power level between the ranges of 10% and 100% of its maximum output.

4.2.5. Target Data Acquisition and Recording During all testing described in 4.2.1, 4.2.2, and 4.2.3, the JLONS shall record data on location and range of targets neutralized, location of the JLONS, threat present, and reaction of neutralization in video and numerical formats. This data shall then be made available for use outside the JLONS by the demonstration of the data or video on a computer system after the testing is completed.

4.2.6. Night Vision The JLONS shall be tested in its fully operational state in standard ambient conditions, while integrated on the prime mover. The prime mover shall be operating (on, but not moving) during all night vision testing. The JLONS shall perform the test described in 4.2.1. in both low-light and negligible light conditions. The test shall either verify or reproduce the ambient light levels of 0.1 lux illuminance for low-light conditions or 0.001 lux illuminance for negligible light conditions. The total time of neutralization shall also be recorded in accordance with test 4.2.3. and rate of neutralization shall be determined. The JLONS must meet the passing requirements for test 4.2.1. and test 4.2.3. while in these low-light or negligible light conditions to meet the night vision requirement.

4.2.7. Accuracy The JLONS shall be tested for accuracy using witness plates marked with a specific aimpoint. The JLONS operator shall align the aiming device directly on the aimpoint, then fire the negation laser. The lazed spot shall be measured to determine its center point. The center point of the lazed spot must be 5 mm or less from the location marked as aimpoint on the witness plate for the JLONS to pass the accuracy requirement.

4.2.8. Beam Slew

4.2.8.1. Slew Rate The rate of beam slew shall be tested both while the device is lasing and when it is not lasing. The beam control system angle with respect to the JLONS prime mover long axis shall be recorded. The beam control system shall then slew to a location 150° from the starting position, in a clockwise direction. The slew shall be timed, and the angle (150°) shall be divided by the total time to slew. The beam control system shall then be returned to its starting position and shall slew 150° in a counterclockwise direction, timed, and the rate shall be calculated in the same manner as the clockwise direction. The beam slew rate while not lasing shall not be less than 30° per second. The same test shall be performed with the beam lasing, with modification that the laser shall slew over a range of ±30° with respect to the long axis of the JLONS prime mover. The rate of slew while lasing shall not be more than 3° per second.

4.2.8.2. Slew Range The beam slew range shall be determined partly by the rate test described in 4.2.9.1. The beam control system shall slew ±150° from the long axis of the JLONS prime mover at a minimum, desired 360° rotation. Angles shall be measured from the centerline of the beam (or beam output window). The system shall also demonstrate the ability to rotate ±20° vertically, measured from the centerline of the beam (or beam output window).

4.2.9. Beam Focus The JLONS shall be tested for beam focus by lazings witness plates located at 25 m and 250 m from the JLONS. The JLONS shall lase the witness plates with the minimum beam size and the diameter of the spot shall be measured. The JLONS shall also lase the witness plates with the maximum beam size and the diameter of the spot shall be measured. The maximum beam size shall be no larger than 10 diameters larger than minimum size.

4.2.10. Endurance The JLONS shall be tested for effectiveness in a four hour test. The JLONS shall meet the effectiveness, rate and range requirements of 4.2.1, 4.2.2, and 4.2.3. for the first and fourth hours of the test following the requirements of those tests. In the second and third hours, it will lase flagged, representative target plates. A proposed test setup is given in Figure 6.2 in Section 6.2. The JLONS shall pass the test if it operates with no degradation of system power or ability for the 4 hours of the test, and passes verification requirements of the tests described in 4.2.1, 4.2.2, and 4.2.3.

4.2.11. Operator Control Console The JLONS operator console design shall be verified and tested for compliance by a AFRL Robotics Research and Development Group representative.

4.3. Interoperability Requirements

4.3.1. Prime Mover Vehicle The JLONS shall be mounted to each prime mover vehicle. The JLONS shall not be permanently attached to any vehicle, and not make modifications that compromise the safety and operation of these vehicles. The JLONS shall be operable and satisfy the requirements of this performance specification while mounted to these vehicles. Verification will be performed through inspection and by meeting the requirements of this performance specification while mounted on prime mover.

4.3.2. Weight The weight of the JLONS in its integrated form on the prime mover shall not exceed 1500 lbs. The center of gravity (CG) of the weight shall not be placed in such a fashion that the CG of the JLONS and the prime mover vehicle together exceeds safe limits of operation.

4.4. Logistics Requirements

4.4.1. System Reliability The JLONS reliability shall be evaluated using mathematical models, reflecting the system composition, operating modes and scenarios. The reliability model shall reflect the reliability allocations as presented to the Government. Final system reliability shall be demonstrated by application of a sequential test method to demonstrate the MTBOMF. Specific test(s) shall be identified in the contractors test program.

4.4.2. Availability The JLONS availability shall be evaluated using mathematical models, reflecting the system composition, operating modes and scenarios. Final system availability shall be demonstrated by application of a sequential test method during JLONS testing. Specific test(s) shall be identified in the contractors test program.

4.4.3. General Transportability (major movement) The JLONS, major subsystems, and LRUs shall be tested in shipping and operational configurations for exposure to vibration caused by the vehicles it is expected to be transported in during its life cycle as specified in MIL-STD-810F, Section 514. The JLONS, major subsystems, and LRUs shall all be tested using Procedure I – General Vibration, and the LRUs and major subsystems in shipping configuration shall be tested for Procedure II – Loose Cargo Transportation. After each test, visual inspection for damage will be performed as well as meet effectiveness requirements specified in 4.2.1. Specific tests for each type of vehicle are described below.

4.4.3.1. Operational Configuration The JLONS in its fully assembled and integrated state shall withstand the vibration of the prime mover vehicle it is mounted to. Testing shall be performed on system components in the configuration they will be in when mounted on the prime mover vehicle on all three axes for a duration of 168 minutes each using the vibration frequency profile shown in MIL-STD-810F, Figure 514.5C-3. “Composite wheeled vehicle vibration exposure”.

4.4.3.2. Shipping Configuration

4.4.3.2.1. Ground

4.4.3.2.1.1. General Vibration – Truck transportation over U.S. Highways Testing shall be performed on LRUs and system components in shipping configuration on all three axes for a duration of 126 minutes each using the vibration frequency profile shown in MIL-STD-810F, Figure 514.5C-1. “U.S. highway truck vibration exposure”.

4.4.3.2.1.2 General Vibration – Mission/field transportation Testing shall be performed on LRUs and system components in shipping configuration on all three axes for a duration of 168 minutes each using the vibration frequency profile shown in MIL-STD-810F, Figure 514.5C-3. “Composite wheeled vehicle vibration exposure”.

4.4.3.2.1.3. Ground – Loose Cargo Testing shall be performed using Procedure II – Loose Cargo Transportation on LRUs and system components in shipping configuration on a standard package tester, shown in MIL-STD-810F, Figure 514.5C-5, for a duration 20 minutes (equivalent to 150 miles).

4.4.3.2.2. Air

4.4.3.2.2.1. General Vibration – Jet aircraft cargo Testing shall be performed on LRUs and system components in shipping configuration on all three axes for a duration of 60 minutes using the vibration frequency profile shown in MIL-STD-810F, Figure 514.5C-6. “Jet aircraft cargo vibration exposure” for the C-5, C-17, and C-141 Aircraft.

4.4.3.2.2.2. General Vibration – Propeller aircraft Testing shall be performed on LRUs and system components in shipping configuration on all three axes for a duration of 60 minutes each using the vibration frequency profile shown in MIL-STD-810F, Figure 514.5C-9, “Propeller aircraft vibration exposure” and Table 514C-II “Propeller aircraft vibration exposure” to determine vibration level and frequencies for the C-130 Aircraft.

4.4.3.2.2.3. General Vibration – Helicopter Testing shall be performed on all LRUs in shipping configuration on all three axes for a duration as calculated for one hour on each axis using the vibration frequency profile shown in MIL-STD-810F, Figure 514.5C-10. “Helicopter vibration exposure” and Table 514C-IV “Helicopter vibration exposure” to determine vibration level and frequencies for the UH-1 and UH-60 Helicopters.

4.4.3.2.3. Sea Testing shall be performed on all items mentioned above on all three axes for a duration of 2 hours per axis using the vibration frequency profile shown in Figure 515.5C-15 and also meeting the sinusoidal requirements of MIL-STD-167-1, Type I, with levels enveloping the highest values for each frequency.

4.4.4. Set-up Time Set-up and strike down shall be accomplished by trained EOD technicians, with the times monitored by the Government or a designated representative. Specific verification methods listed in 4.4.4.1. and 4.4.4.2.

4.4.4.1. Storage to Mission-Ready State The JLONS shall be timed to determine the length of time necessary to prepare the JLONS in a safe area from its storage configuration to its mission-ready configuration integrated onto its prime mover and calibrated for use. The maximum time allowed for this set-up must be 30 minutes or less.

4.4.4.2. Prepare to operate and prepare to travel during mission: The JLONS shall be timed to determine the length of time necessary to prepare the JLONS for lasing once the vehicle has stopped and the length of time necessary to prepare the vehicle for travel once the lasing has stopped. The two times will be added together for the total time. Total time for these procedures not to exceed 4 minutes.

4.4.5. Maintainability The JLONS maintainability shall be demonstrated during the logistics demonstration. Removal and replacement of lowest replaceable units (LRUs) shall be accomplished by trained EOD technicians, with observation and evaluation to be accomplished by the Government or a designated representative.

4.4.6. Training The JLONS training shall be conducted at the beginning of the logistics demonstration. The training products shall be evaluated using MIL-PRF-29612, section 4.2.1, Type A evaluation method. The training shall be conducted in the allotted time. Successful evaluation of the training shall include the ability of the EOD technicians trained to

- ?? Set-up and strike down the JLONS within the allotted time as defined in this performance specification.
- ?? Operate the JLONS within the described JLONS scenarios.

?? Maintain the JLONS through the performance of corrective maintenance down to the LRU.

4.4.7. Portability – Lowest Replaceable Unit (LRU) The JLONS LRUs shall be weighed in shipping configuration. The LRU shall not exceed 70 lbs. per component, and be able to be carried by two people.

4.4.8. Fuels Any JLONS component requiring the use of fossil fuel for power shall operate using JP-8 fuel (NATO F-34) in accordance with DoD Directive 4140.25 and NATO STANAG 4362. The system shall be inspected for compliance.

4.5. Environmental Requirements

4.5.1. Survivability The JLONS in its operational configuration shall be subjected to a blast overpressure of 2.5 psi. The JLONS shall be inspected for damage and meet the effectiveness-neutralization requirement after exposure to the blast overpressure. The JLONS shall also be subjected to a lab-controlled fragmentation test (TBD). After the fragmentation test, the JLONS shall demonstrate survivability by meeting the effectiveness-neutralization requirement. The JLONS shall pass this method if it survives fragmentation 80% of the time.

4.5.2. Decontamination Ability The JLONS in its and mission-ready state shall be subjected to decontamination procedures using hot soapy water and bleach by the methods outlined in Department of Army and Commandant US Marine Corps manual MCWP 3-37.3/FM3-5, and then visually inspected for signs of problems or water intrusion. The JLONS shall then be tested for effectiveness using the test described in 4.2.1. or another equivalent effectiveness test proposed by the contractor.

4.5.3. Shock/drop The JLONS and LRUs shall be tested in its shipping/storage configuration for shock due to dropping during transportation. Each tested item shall be dropped from a height to be determined based on the weight and size of the item as specified in MIL-STD-810F method 516, table 516.5-VI, “Transit Drop Test.” The item shall be visually inspected for damage and then tested for effectiveness using the test described in 4.2.1. or another equivalent effectiveness test.

4.5.4. Blowing Sand The JLONS shall be tested for exposure to blowing sand as specified in MIL-STD-810F, Section 510, using Procedure II – Blowing Sand. The JLONS shall be configured in its operational state fully integrated onto its prime mover vehicle during the test. The test shall consist of 90 minutes of exposure to each vulnerable surface while in 120°F temperatures, after which the JLONS shall be visually inspected for abrasion and damage to coatings, and tested for operational effectiveness as described in 4.2.1. or another equivalent effectiveness test proposed by the contractor.

4.5.5. Temperature

4.5.5.1. Operational Temperature – Maximum The JLONS shall be tested for exposure to a maximum operational temperature for the Hot Climate as specified in MIL-STD-810F, Section 501, using Procedure II – Operational Temperature method 2, constant

temperature. The JLONS shall be tested in its operational state fully integrated onto its prime mover vehicle during the test. The test shall consist of raising the temperature of the JLONS to 120°F for a duration of 4 hours during which time, operational effectiveness shall be tested using method 4.2.1 or another equivalent effectiveness test proposed by the contractor.

4.5.5.2. Operational Temperature – Minimum The JLONS shall be tested for exposure to a minimum operational temperature for the Cold Climate as specified in MIL-STD-810F, Section 502, using Procedure II – Operation. The JLONS shall be tested in its operational state fully integrated onto its prime mover vehicle during the test. The test shall consist of lowering the temperature of the JLONS to -40°F for a duration of 4 hours during which time, operational effectiveness shall be tested using method 4.2.1 or another equivalent effectiveness test proposed by the contractor.

4.5.5.3. Storage Temperature – Maximum The JLONS and LRUs shall be tested for exposure to a maximum storage temperature for the Hot Climate as specified in MIL-STD-810F, Section 501, using Procedure I – Storage Temperature. The JLONS and LRUs shall be tested in their storage configuration during the test. The test shall consist of seven (7) 24-hour cycles of temperatures with a maximum of 160°F according to the table 501.4 – II for Induced Conditions. After the cycles are completed, the JLONS shall be tested for operational effectiveness using method 4.2.1. or another equivalent effectiveness test proposed by the contractor .

4.5.5.4. Storage Temperature – Minimum The JLONS and LRUs shall be tested for exposure to a minimum storage temperature for the Cold Climate as specified in MIL-STD-810F, Section 502, using Procedure I – Storage. The JLONS and LRUs shall be tested in their storage configuration during the test. The test shall consist of lowering the temperature of the JLONS to -45°F for 24 hours. After returning the JLONS and LRUs to standard ambient conditions, operational effectiveness shall be tested using method 4.2.1. or another equivalent effectiveness test proposed by the contractor.

4.5.6. Humidity The JLONS and LRUs shall be tested for exposure to hot, humid environments as specified in MIL-STD-810F, Section 507. The JLONS shall be configured in its operational state fully integrated onto its prime mover vehicle during the test. The test shall consist of a 24-hour conditioning period, followed by five 48-hour humidity cycles. At the conclusion of the test, the JLONS shall be visually inspected for any damage and operationally tested for effectiveness using the test described in 4.2.1. or another equivalent effectiveness test proposed by the contractor.

4.5.7. Rain and/or watertightness The JLONS and all LRUs shall be tested for exposure to rain as specified in MIL-STD-810F, Section 506, Procedure II – Watertightness. The JLONS and LRUs shall be tested in both shipping/storage and operational configurations. The test shall be conducted for no less than 40 minutes on each surface that would normally be exposed to rainfall. The JLONS and LRUs shall be inspected after each 40 minute test for leakage, any water penetrating the system shall be collected and measured. After completion of the testing, the items shall be tested for effectiveness using the test described in 4.2.1. or another equivalent effectiveness test proposed by the contractor.

4.5.8. Vapor Susceptibility The JLONS shall undergo analysis and inspection to verify that no material used in the JLONS shall be susceptible to the vapors described in paragraph 3.5.8.

4.5.9. Solar Radiation JLONS components with exterior exposure shall be subjected to solar radiation as specified in MIL-STD-810F, Section 504, Procedure I, Cycle 1A. The JLONS shall be configured in operational configuration, and shall withstand a minimum of three 24-hour cycles, with temperatures and intensities as shown in MIL-STD-810F, Figure 504.4-1. The JLONS shall be operationally tested during the maximum temperature of each cycle to meet effectiveness-neutralization requirements or perform another equivalent effectiveness test proposed by the contractor.

4.5.10. Temperature Shock The JLONS system components and LRUs in shipping configuration shall be tested to withstand temperature shock as specified in MIL-STD-810F, Section 503, Procedure I. The JLONS shall be tested at a low temperature of -25°F and a high temperature of 120°F. After testing, the JLONS system components and LRUs shall be inspected for damage and tested for effectiveness in a test proposed by the contractor.

4.5.11. Ice/Freezing Rain JLONS components with exterior exposure shall withstand ice accumulation to 13mm and exposure to freezing rain as specified in MIL-STD-810F, Method 521, Procedure 1. The JLONS shall be operationally tested meet effectiveness-neutralization requirements or perform another equivalent effectiveness test proposed by the contractor. Some ice removal to allow movement of parts to prevent damage may be necessary prior to testing.

4.6. System Design Safety The JLONS system design shall meet the requirements of the Navy Laser Hazards Control Program checklist, OPNAV 5100.27A/MCO 5104.1B, where practicable. Specifically, Enclosure (2) of that document shall be the design goal. If tactical considerations prevent compliance with OPNAV 5100.27A/MCO 5104.1B, the Contractor shall request a military exemption from the Government. To receive an exemption, the Contractor must submit a list of deviations from OPNAV 5100.27A/MCO 5104.1B or alternatively, Title 21 CFR, Part 1040 in order for the Government to assess the safety of the laser design. The JLONS will be evaluated for laser hazards by the JLONS Safety Integrated Product Team (IPT), formed from the Army, Navy, and Air Force laser safety offices.

The JLONS must also meet system safety process requirements set by MIL-STD-882D and as interpreted by the Department of the Navy Weapon System Explosives Safety Review Board (WSESRB). The WSESRB is empowered to evaluate safety and environmental concerns related to weapon and explosive systems. Additionally, JLONS Software safety and electronics safety will be verified by independent safety analyses.

4.6.1. Electromagnetic Environmental Effects (E3) Requirements The JLONS and its subsystems shall be characterized in accordance with MIL-STD-464A and MIL-STD-461E to identify the following potential safety hazards:

- Hazards of Electromagnetic Radiation to Personnel (HERP);
- Hazards of Electromagnetic Radiation to Fuel (HERF); and

- Hazards of Electromagnetic Radiation to Ordnance (HERO).

Once characterized, emissions shall be compared with NAVSEA OP 3565 and other references to determine if safe limits shall be exceeded. NAVSEA OP 3565, Chapter 2, Figures 2-2 and 2-3 provide graphs and equations for computing safe field strength and distance related to HERO concerns.

4.6.1.1. Electromagnetic Interference Requirements

4.6.1.1.1. Emissions The JLONS and its subsystems in operational configuration shall be tested for electromagnetic emissions characterization in accordance with the following tests specified in MIL-STD-461E:

CE102 – Conducted Emissions, Power Leads, 10 kHz to 10 MHz

RE101 – Radiated Emissions, Magnetic field, 30 Hz – 100 kHz (not to exceed Army ground systems limits)

RE102 – Radiated Emissions, Electric Field, 10 kHz to 18 GHz

If the JLONS has RF capability, the applicable RF-related emissions tests specified in MIL-STD-461E will be performed.

The JLONS emissions shall not exceed the safe limits for HERO susceptible munitions, as specified in MIL-STD-464A, Table 3A External EME for HERO.

4.6.1.1.2. Susceptibility The JLONS and its subsystems in operational configuration shall be tested for electromagnetic susceptibility characterization in accordance with the following tests specified in MIL-STD-461E:

CS101 – Conducted Susceptibility, Power Leads, 30 Hz to 150 Hz

CS109 – Conducted Susceptibility, Structure Current, 60 Hz to 100 kHz

CS114 – Conducted Susceptibility, Bulk Cable Injection, 10 kHz to 200 MHz

CS115 – Conducted Susceptibility, Bulk Cable Injection, Impulse Excitation

CS116 – Conducted Susceptibility, Damped Sinusoidal Transients, Cables and Power Leads, 10 kHz to 100 MHz

RS101 – Radiated Susceptibility, Magnetic Field, 30 Hz to 100 kHz

RS103 – Radiated Susceptibility, Electric Field, 2 MHz to 40 GHz

If the JLONS has RF capability, the applicable RF-related susceptibility tests specified in MIL-STD-461E will be performed..

The JLONS system shall not be susceptible to the electromagnetic environments it is exposed to in these tests.

4.6.1.2. Electrostatic Discharge The JLONS, components, and LRUs shall be tested in accordance with NAVSEAINST 8020.19 for exposure to human borne electrostatic discharge (25 kV) at the most likely exposure points. All tested items must be in safe and operable condition after testing.

4.6.2. Human Systems Integration JLONS components involving human interface will be inspected for compliance with MIL-STD-1472F and OPNAV 5100.27A/MCO 5104.1B and paragraph 3.6.2. by a government Human Factors Engineering representative.

4.6.3. Remotely Operated System Design Safety The JLONS shall be inspected for compliance with paragraphs 3.6.3.1., 3.6.3.2, 3.6.3.3. and 3.6.3.4. by an AFRL Robotics Research and Development Group representative.

5. Packaging

5.1 Shipment and storage conditions The JLONS shall be packaged in accordance with MIL-STD-2073-1D, to Military Packing Level A (most severe), and shall withstand the environmental specifications for storage and transportation described in Section 3 of this performance specification. Specific packaging requirements as well as choice of packaging for individual components, subsystems, LRUs and other JLONS-related items shall be determined by the contractor in accordance with MIL-STD-2073-1D.

5.1.1 Environmental Requirements The JLONS packaging shall meet environmental conditions specified in Sections 3.5. through 3.5.8. inclusive. The specified components and packaging shall be subjected to the verification requirements in Section 4 corresponding to these conditions.

5.1.2 Transportability The JLONS packaging shall protect the JLONS from shock and vibration associated with transportation by vehicles during its life cycle as specified in paragraphs 4.4.3 through 4.4.3.3. inclusive.

The JLONS shall be designed to meet the weight, size, and restraint (tie-down) provisions for transportation requirements of Interface Standard for Transportability Criteria, MIL-STD-1366. Aircraft items approaching the size, weight, ramp angle or other loading considerations shall be in accordance with the AFR 80-18.

5.2. Testing Any packaged JLONS component, subsystem, or LRU shall pass verification requirements set forth in Section 4 of this performance specification as well as meet the testing requirements of ASTM 4169-04a, Schedule DC-18, Assurance level II or better. Similar tests between the two specifications shall not be duplicated, and the more rigorous of the tests shall be used. Passing criterion shall be as specified in Section 4 of this Performance Specification or to Criterion 3 in ASTM 4169-04a (product is damage-free and package is intact).

Testing of hazardous material packages shall be in accordance with the applicable requirements for performance packaging contained in the International Air Transport Association (IATA) Dangerous Goods Regulations, International Maritime Dangerous Goods Code (IMDG) and the Code of Federal Regulations (CFR) Title 29, 40, and 49. Material Safety Data Sheets (MSDS) complying with FED-STD-313 shall be provided.

5.3. Marking Any JLONS package used for shipping and/or storage shall be marked in accordance with MIL-STD-129P.

6. Notes

6.1. Proposed test setup for requirements 4.2.1. Effectiveness-Neutralization, 4.2.2. Effectiveness – Range, and 4.2.3. Rate of Neutralization

Figure 6.1 and Table 6.1. Show the proposed test setups with specific ordnance items represented at specific locations with respect to the JLONS. The JLONS shall be positioned at the center of the test, and distances shall be measured from the JLONS. Each numbered position in Figure 6.1 corresponds to the numbered ordnance item in Table 6.1. Orientation in Table 6.1. refers to the angle the negation laser shall strike the ordnance item at with respect to the surface of the item. The items shall be placed in such a way that when the JLONS slews to the item, the ordnance is already at the proper angle with respect to the beam.

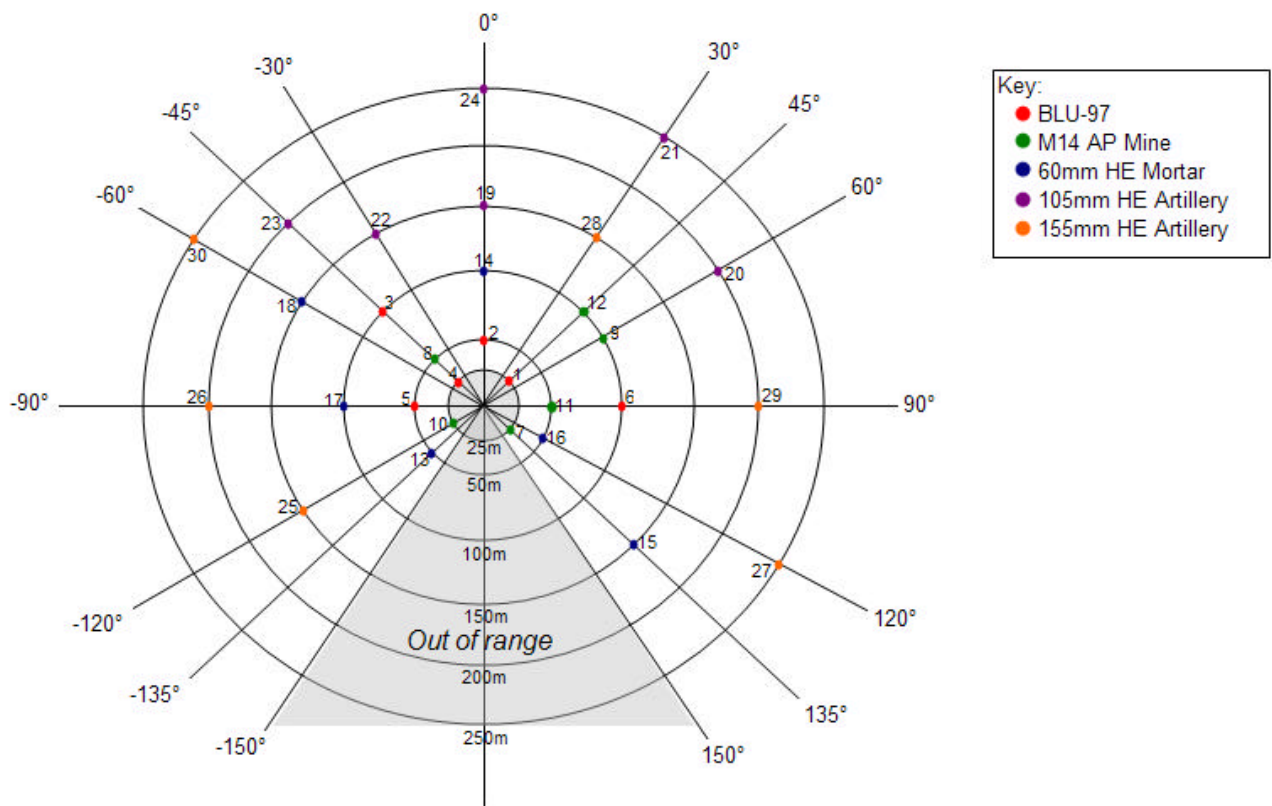


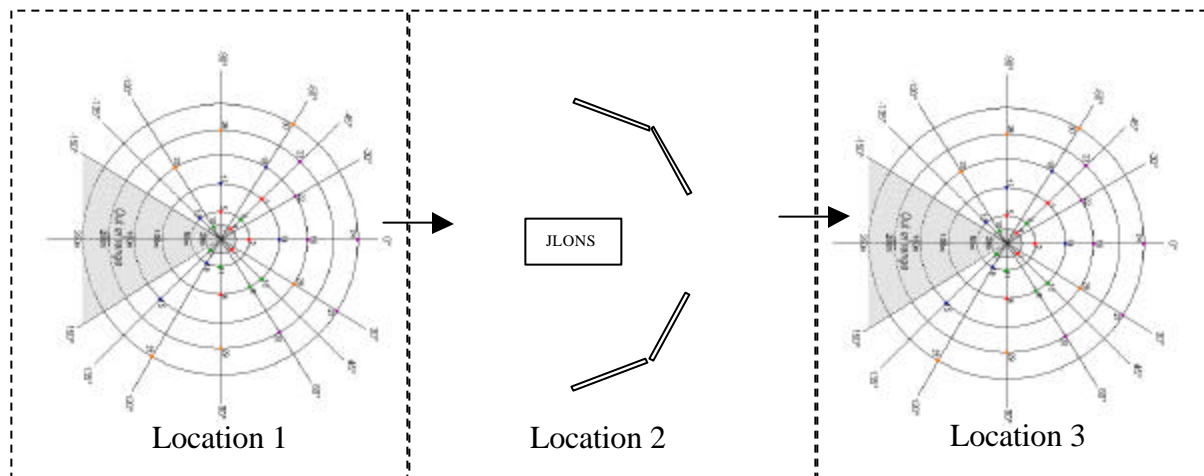
Figure 6.1. – Location of Ordnance Items with respect to JLONS. The JLONS will be oriented at the center of the diagram, with the front of the vehicle pointing along the 0° line.

Table 6.1 – Location and Orientation of Ordnance Items for Testing

BLU-97 (25m – 100m)			M14 AP Mine (25m – 100m)			60 mm HE Mortar (50m – 150 m)		
#	Location	Orientation	#	Location	Orientation	#	Location	Orientation
1	25 m, 45°	Normal	7	25m, 135°	N/A	13	50m, -135°	Normal
2	50 m, 0°	Normal	8	50m, -45°	N/A	14	100m, 0°	Normal
3	100m, -45°	Normal	9	100m, 60°	N/A	15	150m, 135°	Normal
4	25m, -45°	45°	10	25m, -120°	N/A	16	50m, 120°	45°
5	50m, -90°	45°	11	50m, 90°	N/A	17	100m, -90°	45°
6	100m, 90°	45°	12	100m, 45°	N/A	18	150m, -60°	45°
105mm HE Artillery (150m – 250 m)			155mm HE Artillery (150m – 250 m)					
#	Location	Orientation	#	Location	Orientation			
19	150m, 0°	Normal	25	150m, -120°	Normal			
20	200m, 60°	Normal	26	200m, -90°	Normal			
21	250m, 30°	Normal	27	250m, 120°	Normal			
22	150m, -30°	45°	28	150m, 30°	45°			
23	200m, -45°	45°	29	200m, 90°	45°			
24	250m, 0°	45°	30	250m, -60°	45°			

6.2. Proposed test setup for requirement 4.2.10, Endurance

In the figure below, the test will start with the JLONS in Location 1. Here, the JLONS will have 60 minutes to neutralize 30 ordnance items, comprised of the ordnance items listed in test 4.2.1., in the configuration shown in Figure 6.1 and Table 6.1. The JLONS must meet the neutralization, rate and range requirements of tests 4.2.1, 4.2.2., and 4.2.3. during this hour. When these 60 minutes are complete, the JLONS shall drive to Location 2 where it shall laze representative targets mounted on target stands. These targets may include: metal plates of various thicknesses, concrete slabs, guard rail sections, sand bags and plastic containers. The distance from the JLONS to the target stands shall be approximately 50 meters. During the second and third hours of operation, the JLONS shall remain in Location 2. For the last 60 minutes of the test, the JLONS shall drive to location 3, where it will laze another set of ordnance items. The format of this last segment of testing shall be similar to the first 60 minutes, wherein the ordnance will be similar and the JLONS must meet the neutralization, rate and range requirements of tests 4.2.1, 4.2.2., and 4.2.3.

**Figure 6.2. Proposed Endurance Test Setup** Note: Diagram not to scale